

WHAT IS CLAIMED IS:

1. A chemical vapor deposition process for forming a  $\text{SiO}_2$  layer on a substrate comprising reacting water with a silicon precursor compound having the structure  $\text{SiX}_4$ ,  $\text{Si}(\text{NR}_2)_4$ ,  $\text{Si}(\text{OH})_a(\text{OR})_{4-a}$  or  $\text{SiH}_b(\text{OR})_{4-b}$  wherein R is an alkyl group, each X is independently a halogen atom, and a and b are numbers from 0-4, in the presence of the substrate at a temperature of between about 290 K and 350 K and in the presence of ammonia or a Lewis base catalyst that is a gas under the conditions of the chemical vapor deposition process.
2. The process of claim 1 wherein the silicon precursor is  $\text{SiCl}_4$  or  $\text{Si}(\text{OR})_4$  where each R contains up to four carbon atoms.
3. The process of claim 1 wherein the temperature is from about 313 to about 333 K.
4. The process of claim 1 wherein water is continually added to the process, and the silicon precursor is added intermittently.
5. The process of claim 4 wherein the ammonia or Lewis base is added intermittently to the process.
6. The process of claim 5 wherein the silicon precursor is added during the addition of the ammonia or Lewis base.
7. The process of claim 5 wherein the silicon precursor is  $\text{SiCl}_4$  or TEOS.
8. The process of claim 7 wherein ammonia is added to the process.
9. The process of claim 5 wherein the Lewis base catalyst is a primary, secondary or tertiary amine.

10. The process of claim 1 wherein the substrate is silicon.

11. The process of claim 1 wherein the substrate is an organic polymer.

12. The process of claim 1 wherein the substrate is a biological material.

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